

Health Consultation

Review of Basement Sampling Data

CHICAGO HEIGHTS BOULEVARD VOC PLUME SITE
OVERLAND, ST. LOUIS COUNTY, MISSOURI

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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OVERLAND, ST. LOUIS COUNTY, MISSOURI

Prepared by:

Missouri Department of Health
Section for Environmental Public Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Statement of Issues and Background

Statement of Issues

The Missouri Department of Health (DOH), in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR), has prepared this health consultation at the request of the Missouri Department of Natural Resources (MDNR) to review basement sampling data collected from homes above a plume of volatile organic compounds (VOCs) at the Chicago Heights Boulevard VOC Plume site.

Background

The Chicago Heights Boulevard VOC Plume site is located within a primarily residential area consisting of both multi-family and single-family dwellings (1). The site is approximately six square blocks, and is generally bounded by Meeks Boulevard to the north, Werremeyer Place to the east, Chicago Heights Boulevard to the south, and Elmridge Place to the west. The site is surrounded by various industrial and commercial businesses and lies within an unincorporated segment of St. Louis County, Missouri near the town of Overland (1). The site was discovered as a part of previous environmental investigations conducted of a nearby property known as EG&G Missouri Metals (EG&G) (1). Chlorinated solvents were found in the groundwater beneath a residential area located just south of the EG&G property, now known as the Chicago Heights Boulevard VOC Plume site (1).

Groundwater flow in the area appears to be in a southeasterly direction. Depth to groundwater is not well defined. In the northwest part of the site, the depth to bedrock is 19 feet. In that area, there is approximately 8 feet of native material overlain by 11 feet of fill. In an effort to determine whether EG&G was the source of the groundwater contamination in the residential area, several soil borings were conducted and subsequent soil and groundwater samples collected (1). The contaminants of concern consist primarily of tetrachloroethene (PCE) and trichloroethene (TCE), and their breakdown products (1).

A public water supply is in place at the site, and no one is known to be using groundwater for household purposes (1). Most basements in the area have sump pumps which collect water that has drained from around the outside of the house and/or has seeped into the basements through cracks in the foundations (1). Previous investigations found that residences with basements in the path of the VOC plume were subject to a potential threat from vapors emanating from contaminated groundwater entering the basements or from vapor migration through walls (1). MDNR, with concurrence of DOH, recommended air and water sampling in basements in the path of the plume to determine if contaminated groundwater was entering the basements (1).

MDNR conducted a site reassessment for the Chicago Heights Blvd. VOC Plume site on April 24, 2001 (1). During the reassessment, a total of seven homes were sampled for VOCs (1). Indoor air samples were collected in the basements of five homes using Summa Canisters for a period of 8 hours (1). Water samples were also collected from the sumps of three of these homes. Two additional homes had sumps sampled, but no indoor air sampling (1). All samples were analyzed for 82 volatile organic chemicals (1).

Table 1, in Appendix 1, lists the results of sample analysis for water samples collected. Table 2, in Appendix 1, lists the results of sample analysis for air samples collected. In regards to these tables, an MCL is a regulatory standard set by EPA, which represents the maximum permissible level of a contaminant in water that is delivered to the free-flowing outlet of the ultimate user of a public water system. EMEGs, which were developed by ATSDR, are Evaluation Guides that are specific to an Environmental Medium (air, water, soil), below which adverse health effects are unlikely. EMEGs are used by health assessors to screen out which chemicals are of concern and need further evaluation.

Discussion

In the water samples collected from the sump pumps of five homes, only four chemicals, cis-1,2-dichloroethene (DCE), chloroform, trichloroethene (TCE), and tetrachloroethene (PCE), were detected. Sample results were compared to EPA's Maximum Contaminant Level for Drinking Water, which is a regulatory standard for public drinking water. Two of the samples exceeded these screening values. However, because this is water that was collected from basement sump-pumps it is unreasonable to believe that anyone would be drinking it. In addition, a public water supply is in place at the site, and no one is known to be using groundwater for household purposes. Therefore, exposure to contaminants at this site through ingestion is not expected to be of concern.

Because the chemicals detected in the sump-pump water are known to volatilize into air, air samples were collected in five basements. Of the four chemicals detected in sump-pump water, only two were detected in basement air, TCE and DCE. TCE results were compared to the chronic exposure EMEG for TCE in air. All of the basement air samples that detected TCE were at levels below the EMEG and are therefore unlikely to cause adverse health effects. ATSDR has not developed an EMEG for DCE in air. Another screening tool used by ATSDR and DOH to determine if health effects are likely to occur from chemical exposures are Reference doses. A Reference dose is the daily dose of a chemical found in a specific medium (e.g., air, water, soil) that levels below which are unlikely to cause adverse health effects. The calculated dose for DCE in basement air was several orders of magnitude below the reference dose, and therefore adverse health effects are not likely to occur from exposures to DCE-contaminated basement air.

In addition to the four chemicals found in sump pump water, basement air sampling detected a number of other VOC-contaminants that are listed in Table 2. Although these chemicals are not believed to be related to the site, DOH compared the levels found in basement air to chronic exposure EMEGs and reference doses for each contaminant, to determine if they were of health concern. None of the chemicals detected in basement air were found to be above an EMEG or a Reference dose, and therefore are not at levels of health concern. Many of the chemicals that were detected in basement air are constituents of common household and yard items such as gasoline, paints and paint thinners and other solvents. Although the sources of these contaminants are unknown at this time, they may be household items that are being stored in the basements of the individual homes. Because DOH recommends that people not voluntarily expose themselves to hazardous chemicals, it may be prudent for homeowners to remove or

relocate any solvents from their basements that are unnecessarily contributing to VOC-contamination in basement air.

Although the Site Reassessment and sampling event were conducted in the spring, when it is presumed that the ground is most saturated, it is difficult to determine if the samples collected during this event are representative of conditions in basements above the VOC plume year-round at this site. Further sampling may be necessary to determine if seasonal variations have an effect on VOC-contaminant concentrations in basement air and sump-pump water.

Children's Health

Potential exposures to children were considered in developing this consult. Because all chemicals were detected below levels of health concerns, health effects are not expected.

Conclusions

The Chicago Heights Boulevard VOC Plume Site has been classified as a No Apparent Public Health Hazard. This conclusion is based on the following:

1. Contaminants that are believed to be attributable to the Chicago Heights Boulevard VOC Plume Site (DCE, TCE, PCE and Chloroform) detected in sump-pump water and/or basement air are not at levels expected to cause adverse health effects. Other VOC contaminants, from unknown sources, have been detected in basement air, but are also not at levels that are expected to cause adverse health effects.
2. Sources of some contaminants found in basement air during sampling are unknown. Determining the sources of these contaminants and eliminating them may be a way to reduce exposures to hazardous chemicals.
3. Further sampling may be necessary to determine if samples collected during the Site Reassessment are representative of year-round conditions in basements above the site.

Recommendations

1. Determine the sources of VOC-contaminants in basement air to reduce or eliminate unnecessary exposures.
2. Consider conducting further sampling to determine if samples collected during the Site Reassessment are representative of year-round conditions in basements above the site.

Public Health Action Plan

This Public Health Action Plan (PHAP) for the Chicago Heights Boulevard VOC Plume site contains a description of actions to be taken by the Missouri Department of Health (DOH), the Agency for Toxic Substances and Disease Registry (ATSDR), and others. The purpose of the PHAP is to ensure that this health consultation not only identifies public health hazards, but also provides an action plan to mitigate and prevent adverse human health effects resulting from past, present, and/or future exposures to hazardous substances at or near the site. Included is a commitment from DOH and/or ATSDR to follow up on this plan to ensure that it is implemented. The public health actions to be implemented by DOH, ATSDR and/or cooperators are as follows:

Ongoing Activities

1. DOH/ATSDR will coordinate with the appropriate environmental agencies to assure that recommendations in this health consultation are implemented.
2. DOH/ATSDR will coordinate with the appropriate environmental agencies to continue to address community health concerns as they arise.

Future Activity

DOH/ATSDR will evaluate any further data that becomes available about human exposure or contaminants at this site.

Preparers of the Report:

Sara Colboth and Scott Clardy, Missouri Department of Health.

Attachment:

Appendix 1 – Tables 1 and 2

Reference

1. Allen, Brian J., Site Reassessment Investigation Report, Chicago Heights Boulevard VOC Plume Site, Overland Missouri. Missouri Department of Natural Resources. 24 Apr 2001.

Certification

This Chicago Heights Boulevard Health Consultation was prepared by the Missouri Department of Health under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was initiated.

Roberta Eber
Technical Project Officer, SPS, SSAB, DHAC

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.

Richard Kelly
Section Chief, SPS, SSAB, DHAC, ATSDR

Appendix 1

Table 1
Water Samples Collected From Basement Sumps
With Detectable Concentrations of Volatile Organic Chemicals
Chicago Heights Boulevard VOC Plume Site
All results in parts per billion (ppb)

Analytes	011-9859	011-9860	011-9861	011-9862	011-9863	MCL
Cis-1,2-Dichloroethene	73.2	<1.0	83.7	<1.0	<1.0	70
Chloroform	<1.0	<1.0	25.5	<1.0	<1.0	80
Trichloroethene	1,140	<1.0	66.5	<1.0	<1.0	5
Tetrachloroethene	1.5	<1.0	<1.0	3.7	2.3	5

MCL = EPA's Maximum Contaminant Level for Public Drinking Water

Table 2
Air Samples Collected in Basements
With Detectable Concentrations of Volatile Organic Chemicals
Chicago Heights Boulevard VOC Plume Site
All results in parts per billion (ppb)

Analytes	011-9865	011-9866	011-9867	011-9868	011-9869	EMEG
Acetone	8.1	<4.6	20.0	110.0	17	13,000
Methylene Chloride	<1.5	11	<1.2	<1.1	1.4	300
Hexane	<6.0	9.4	<4.6	9.2	<4.6	600
Benzene	2.4	2.6	<1.2	2.1	<1.2	50
Trichloroethene	12	<1.2	12	<1.1	<1.2	100
Toluene	9.5	15	4.1	5.0	3.2	80
Ethylbenzene	3.8	<1.2	<1.2	<1.1	<1.2	1000
Total Xylenes (m, p, and o)	5.3	12.4	<1.2	1.4	<1.2	100
cis-1,2-Dichloroethene	<1.5	<1.2	8.6	<1.1	<1.2	None
Methyl Tertiary Butyl Ether (MTBE)	17	30	<4.6	<4.5	<4.6	700

EMEG = Environmental Media Evaluation Guide for Chronic Exposure in Air.